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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JOSEP SOLA I CAROS and JOSEF X. BRUNNER

Appeal 2017-002012
Application 14/115,384
Technology Center 3700

Before: JOHN C. KERINS, WILLIAM A. CAPP, and LEE L. STEPINA, *Administrative Patent Judges*.

STEPINA, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a rejection of claims 1–22 and 24–26.[1] We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM-IN-PART.

[1] Claim 23 is cancelled. Appeal Br. 21 (Claims App.).

CLAIMED SUBJECT MATTER

The claims are directed to a method for determining, non-invasively, a heart-lung interaction. Claim 1, reproduced below, is illustrative of the claimed subject matter:

> 1. Method for assessing intravascular fluid status of a subject by determining non-invasively a functional hemodynamic parameter from a heart-lung interaction factor (HLI) of the subject, comprising:
>
> using a physiological sensor to measure a heart activity-related signal comprising heart activity-related information;
>
> from the heart activity-related signal, calculating a frequency of cardiac cycle (f_h) and a frequency of respiratory cycle (f_r);
>
> from the heart activity-related signal, determining a cardiac cycle energy (E_h) at the frequency of cardiac cycle (f_h), determining a respiratory cycle energy (E_r) at the frequency of respiratory cycle (f_r);
>
> from the heart activity-related signal, determining a heart-lung interaction energy (E_{hli}) at an intermodulation frequency (f_{hli}) corresponding to the difference between the frequency of respiratory cycle (f_r) and the frequency of cardiac cycle (f_h), or the sum of the frequency of respiratory cycle (f_r) and the frequency of cardiac cycle (f_h);
>
> determining said heart-lung interaction factor (HLI) from the ratio of the heart-lung interaction energy (E_{hli}) and one of the cardiac cycle energy (E_h) and the respiratory cycle energy (E_r); and
>
> determining said functional hemodynamic parameter from the heart-lung interaction factor.

Appeal Br. 18 (Claims App.).

REJECTIONS

Claims 1–22 and 24–26 are rejected under 35 U.S.C. § 101 as being directed to ineligible subject matter.[2]

OPINION

Claim 1[3]

The Examiner finds that claim 1 "amounts to nothing more than the abstract idea of a mathematical procedure for converting one form of numerical representation to another, without claiming significantly more." Final Act. 3. In this regard, the Examiner states, "[Appellants'] claims recite the collection of data using a generic sensor, and converting that data to another form and outputting the data as another form." *Id.* at 8. The Examiner also refers to the subject matter of claim 1 as "an idea of itself." Advisory Act. 2.

The Examiner also finds that claim 1 is directed to "the natural phenomena of heart and lung interaction" without significantly more. *Id.* at 3. The Examiner states, "the method is drawn to a natural phenomenon, as the process obtains data, which naturally occurs in nature and uses the naturally occurring data to state a natural occurrence in the body." *Id.* at 8.

Appellants assert that the Examiner has not provided sufficient analysis as to why claim 1 is directed to an abstract idea. *See* Appeal Br. 7–8. Appellants contend that "claim 1 is directed to a concrete application

[2] The Examiner withdrew rejections of claim 23 under 35 U.S.C. § 102 and 112 in light of the cancellation of claim 23. Ans. 4.

[3] The Examiner addresses the discussion of patent eligibility to claims 1–22 and 24–26 as a group. Final Act. 2–4.

through the use of physiological sensors to determine properties and parameters having physical meanings associated with a subject that is monitored by those very sensors." *Id.* at 9. Appellants also assert that "claim 1 is no more directed to a natural phenomenon than any mechanical apparatus that relies on or measures Newton's laws (e.g., a gravimeter or accelerometer). That is, claim 1 relies on the natural phenomenon, but does not seek to tie up the existence of the natural phenomenon." Appeal Br. 10. Appellants further argue that claim 1 recites significantly more than an abstract idea, and the claimed subject matter is comparable to the subject matter claimed in *Diamond v. Diehr*, 450 U.S. 175 (1981).

In response, the Examiner finds that claims 1–22 and 24–26 are analogous to the subject matter claimed in *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016). Ans. 5. The Examiner concludes that "The use of a generic physiological sensor to collect the data to which the abstract idea is performed on does not alter the fact that it is an abstract idea that can be performed in a person's mind or by mathematical algorithms, as mental processes within the abstract idea category." Ans. 6.

In reply, Appellants argue that the "present claims"[4] solve problems in the technical field of medical diagnostic and treatment technology and "this alone is sufficient to be considered 'significantly more' than the alleged abstract idea and thus render[s] the claims patent eligible." Reply Br. 2. Appellants also assert that "the claims" recite a new method having specific "steps/rules" that result in improvements in a technical field. *See* Reply Br. 2–3 (discussing *McRO, Inc. v. Bandai Namco Games Am. Inc.*, No. 2015-1080, 2016 WL 4896481 (Fed. Cir. 2016)).

[4] In the Reply Brief, Appellants argue all the claims as a group. *See* Reply Br. 2–8.

In *Alice*, the Supreme Court applied the framework set forth previously in *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012), "for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 134 S. Ct. 2347, 2355. The first step in the analysis is to "determine whether the claims at issue are directed to one of those patent-ineligible concepts." *Id.* If so, the second step in the analysis is to consider the elements of the claims "individually and 'as an ordered combination' to determine whether [there are] additional elements" that "'transform the nature of the claim' into a patent-eligible application." *Id.* (quoting *Mayo*, 132 S. Ct. at 1297). In other words, the second step is to "search for an 'inventive concept'--i.e., an element or combination of elements that is 'sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.'" *Id.* (alteration in original) (quoting *Mayo*, 132 S. Ct. at 1294).

We determine that claim 1 is directed to the abstract idea of the mathematical analysis of a heart activity-related signal. In this regard, "[w]ithout additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible." *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1351 (Fed. Cir. 2014). In *Digitech*, claim 10, held to be directed to patent-ineligible subject matter, recited:

> *generating first data* for describing a device dependent transformation of color information content of the image to a device independent color space through *use of measured chromatic stimuli* and device response characteristic functions;

> *generating second data* for describing a device dependent transformation of spatial information content of the image in said device independent color space through use of spatial stimuli and device response characteristic functions; and
>
> *combining said first and second data* into the device profile.

Id. We find the requirements of claim 1 in the present case to be similar to those of the claim covering patent ineligible subject matter in *Digitech* inasmuch as claim 1 also requires use of a generically measured parameter (a heart activity-related signal), and further processes this measured parameter to produce a final parameter (functional hemodynamic parameter).

Claim 1 is also similar to the claim in *Mayo* held to cover patent-ineligible subject matter, which recited:

> A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:
>
> (a) administering a drug providing 6-thioguanine to a subject having said immune-mediated gastrointestinal disorder; and
>
> (b) determining the level of 6-thioguanine in said subject having said immune-mediated gastrointestinal disorder,
>
> wherein the level of 6-thioguanine less than about 230 pmol per $8x10^8$ red blood cells indicates a need to increase the amount of said drug subsequently administered to said subject and
>
> wherein the level of 6-thioguanine greater than about 400 pmol per $8x10^8$ red blood cells indicates a need to decrease the amount of said drug subsequently administered to said subject.

US 6,355,623 (claim 1); *see also Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. at 1295. Claim 1 in the present case is similar to the claim at issue in *Mayo* because both claims set forth a relationship between one biological characteristic (concentrations of metabolites in *Mayo*, the

heart activity-related information in claim 1) and another (dosage effects in *Mayo*, the functional hemodynamic parameter in claim 1).

Accordingly, we agree with the Examiner—claim 1 is directed to an abstract idea, as was the claim in *Digitech*. We also agree with the Examiner that claim 1 is directed to a natural phenomenon.

As for the second step of *Alice*, we are not apprised of error in the Examiner's determination that claim 1 does not recite an element or combination of elements that is sufficient to ensure that the patent in practice amounts to significantly more than a claim upon the abstract idea or natural phenomenon itself. Rather, aside from the generic recitation of a "physiological sensor" (the use of such sensor) to measure a heart activity-related signal comprising heart activity-related information, claim 1 recites a series of calculating and determining steps that amount to a recitation of a series or relationships, correlations, or mathematical operations that characterize the above-noted concepts. These steps, taken individually or as an ordered combination, fail to add enough to the claim to allow it to survive the second step of *Alice*. Accordingly, we sustain the Examiner's rejection of claim 1 as being directed to patent-ineligible subject matter.

Claims 2–22 and 24

The Examiner's discussion of the claimed subject matter appears under the heading "Claims 1–22 and 24–26," but the Examiner does not provide separate discussions of each of the claims. *See* Final Act. 2–4.

Appellants contend that the Examiner "failed to provide any analysis regarding the dependent claims. This is itself a failure to establish a *prima facie* rejection of the claims." Appeal Br. 15. Aside from asserting that

these dependent claims were not addressed by the Examiner, Appellants make no separate arguments for claims 2–22 and 24. *See* Appeal Br. 15.

In response, the Examiner discusses claims 2 and 20–22 as a group, claims 3, 16–19, 24, and 26 as a group, and claims 4–14 and 25 as a group. *See* Ans. 9–10. In the Reply Brief, Appellants provide no arguments directed specifically to the Examiner's discussion of 2–22 and 24, and instead argue all the claims as a group. *See* Reply Br. 2–7. We do not agree with Appellants' argument that the Examiner did not address the dependent claims because, in the Final Office Action, the Examiner discussed the subject matter recited in claims 2–22 and 24 together with the subject matter recited in the independent claims, and the Examiner addressed Appellants' contention regarding lack of specificity by providing further discussion in the Answer. Accordingly, we affirm the Examiner's rejection of claims 2–22 and 24

Claim 25

Aside from incorporating the arguments made for claim 1, Appellants argue that claim 25:

> specifically recites the use of an electrical impedance tomography (EIT) imaging for measuring the heart activity-related signal. This specific type of sensor was not acknowledged or analyzed in the examiner's rejection. Moreover, in reciting the use of EIT imaging, the claim is directed to an even more particular application of claim 1 and the sensor therein. Further, EIT imaging represents the application of a particular machine, which can also be considered "significantly more." Interim Guidance, pg. 21.

Appeal Br. 16.

In response, the Examiner states that the recitation of features relating to the use of the EIT sensor "does not change *the generic function of using a*

generic EIT sensor to collect an EIT signal, which is then later manipulated by the abstract ideas." Ans. 9–10 (emphasis added).

Appellants' argument on this issue is persuasive. In effect, claim 25 recites a new use for electrical impedance tomography that qualifies as an improvement of an existing technological process similar to the circumstances in *McRO*. *See McRO, Inc. v. Bandai Namco Games Am. Inc.*, 2016 WL 4896481 at 1314 (stating "We therefore look to whether the claims in these patents focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery."). In the present case, the recitation of using an "electrical impedance tomography (EIT) signal obtained from a plurality of pixels of EIT images acquired by using an EIT imaging measurement technique" is so specific that we cannot agree with the Examiner that this feature is "generic." Nor do we agree with the Examiner that claim 25 is directed to an abstract idea or a natural phenomenon. Rather, the requirements set forth in claim 25, relating to using an EIT signal, place this claim in the same category as claim 1 of *McRo*. *See id.* at 1308, 1314–1315. Thus, claim 25 survives step one of the *Alice* test, and we therefore reverse the Examiner's rejection of claim 25 as being directed to patent ineligible subject matter.

Claims 4–14

Claim 4 depends from claim 1 and recites, "wherein said heart activity-related signal comprise an electrical impedance tomography (EIT) signal obtained from a plurality of pixels of EIT images acquired by using an EIT imaging measurement technique." For similar reasons to those

discussed above regarding claim 25 and the EIT signal, we likewise reverse the Examiner's rejection of 4 or claims 5–14 depending therefrom.

Claim 26

Aside from the arguments made for claim 1, Appellants argue that claim 26:

> specifically recites that the heart activity-related signal is an arterial pressure signal or a blood flow signal. This specific type of signal was not acknowledged or analyzed in the examiner's rejection. Moreover, limiting the type of signal inherently limits the type of sensor that can be used to one that is capable of measuring arterial pressure or blood flow. In this way, the claim is directed to an even more particular application of claim 1 and the sensor therein.

Appeal Br. 16–17.

In response, the Examiner finds that the sensors are still generic physiological sensors, and claim 26 does not recite significantly more than the abstract idea identified by the Examiner. Ans. 9.

We are not persuaded by Appellants' arguments regarding claim 26. Unlike claim 25, which recites a specific type of technology used in the recited sensor, claim 26 recites that the signal is an "arterial pressure signal or a blood flow signal," which limitations only generically state the parameter measured by the sensor. In other words, claim 26, like claim 1, recites a relationship between one biological characteristic and another without reciting an inventive concept sufficient to transform the patent-ineligible concept into patent-eligible subject matter. Accordingly, we affirm the Examiner's rejection of claim 26.

DECISION

The Examiner's rejection of claims 1–22 and 24–26 is affirmed as to claims 1–3, 15–22, 24, and 26 and reversed as to claims 4–14 and 25.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART